IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES
Docket No. 13297US01

IN THE APPLICATION OF:

Wilfrid LeBlanc

Electronically Filed on August 28, 2008.

SERIAL NO.:   10/077,405

FILED: February 15, 2002

FOR: JITTER BUFFER AND LOST-
      FRAME-RECOVERY
      INTERWORKING

ART UNIT: 2616

EXAMINER: Warner Wong

Conf. No.:   4140

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

    This is an appeal from an Office Action dated November 27, 2007, in which claims 1-14, 18-25, and 27-33 were finally rejected.

REAL PARTY IN INTEREST

    Broadcom Corporation, a corporation organized under the laws of the state of California, and having a place of business at 5300 California Avenue, Irvine, California 92617, has acquired the entire right, title and interest in and to the invention, the application, and any and all patents to be obtained therefor, as set forth in the Assignment recorded at Reel 012833, Frame 0644 in the PTO assignment search room.

RELATED APPEALS AND INTERFERENCES

There currently are no appeals pending regarding related applications.

STATUS OF THE CLAIMS

Claims 1-14, 18-25, and 27-33 are pending in the present application. Claims 15-17 and 26 were previously cancelled. Pending claims 1-14, 18-25, and 27-33 stand rejected and are the subject of this appeal.

STATUS OF THE AMENDMENTS

None.

SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 is directed to a method of processing a transmitted digital media data stream comprising a stream of data elements. Pursuant to said method, the data stream is received and each data element that is received prior to the end of a time period associated with each data element is held in a buffer until the end of the time period, at which time the data element is released for playout. A loss rate at which data elements in the data stream are not received by the end of their respective time periods is monitored. The duration of the time period is adjusted based upon the loss rate.

The invention of claim 1 is illustratively described in the Specification of the present application at, for example, paragraphs [113] - [121], referring to Figures 9 and 10. At step 900 of Figure 9, the data stream is received. At step 910, each data element that is received prior to the end of a time period associated with each data element is held in a buffer until the end of the time period, at which time the data element is released for playout. The end of said time period is referred to as the playout deadline.[1] At step 920 of Figure 9, a loss rate at which data elements in the data stream are not received by the end of their respective time periods is monitored. At step 930, the duration of the time

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[1] See, e.g., Specification, paragraph [111], lines 13-16

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period is adjusted based upon the loss rate. The invention of claim 1 is also described in other parts of the application, such as in the Summary of the Invention section.

Claims 2-11 are dependent upon claim 1.

Claim 12 is directed to a method of estimating an unreceived data element of a transmitted digital media data stream comprising a stream of data elements. Pursuant to said method, the data stream is received and each received data element is held in a jitter buffer until an end of a time period associated with each data element, at which time the data element is released for playout. A parameter of an unreceived data element is estimated based on a received subsequent data element. The loss rate at which data elements in the data stream are not received by the end of their respective time periods is monitored. The duration of the time period is adjusted based upon the loss rate.

The invention of claim 12 is illustratively described in the Specification of the present application at, for example, paragraphs [111]-[121], referring to Figures 8-10. At step 900 of Figure 9, the data stream is received. At step 910, each data element that is received prior to the end of a time period associated with each data element is held in a buffer until the end of the time period, at which time the data element is released for playout. The end of said time period is referred to as the playout deadline.[2] Step 810 of Figure 8 states that a parameter of an unreceived data element is estimated based on a received subsequent data element. At step 920 of Figure 9, a loss rate at which data elements in the data stream are not received by the end of their respective time periods is monitored. At step 930, the duration of the time period is adjusted based upon the loss rate. The invention of claim 12 is also described in other parts of the application, such as in the Summary of the Invention section.

Claims 13-22 are dependent upon claim 12.

Claim 23 is directed to a system of estimating an unreceived data element of a transmitted digital media data stream comprising a stream of data elements, the system includes a jitter buffer, a lost data element recovery mechanism, and a controller. The jitter buffer receives a transmitted digital media data stream and holds each received data element until an end of a time period, at which time the data element is released for playout. The lost data element recovery mechanism estimates a parameter of an

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[2] See, e.g., Specification, paragraph [111], lines 13-16

unreceived data element based on a received subsequent data element that follows the unreceived data element in the data stream. The controller monitors a loss rate at which data elements in the data stream are not received at the jitter buffer by the end of their respective time periods. The controller adjusts a duration of the time period based upon the loss rate.

The system of claim 23 is illustratively described in the Specification of the present application at, for example, paragraphs [105]-[121], referring to Figures 8-10. The jitter buffer, such as the jitter buffer constituted by voice queue 86 and voice synchronizer 90 of Figure 6, receives a transmitted digital media data stream and holds each received data element until an end of a time period, at which time the data element is released for playout.[3] Figure 7 includes a lost data element recovery mechanism that includes a voive analyzer 192, a voice synthesizer 194 and a selector 196.[4] In an illustrative embodiment, the lost data element recovery mechanism estimates a parameter of an unreceived data element based on a received subsequent data element that follows the unreceived data element in the data stream.[5] A controller monitors a loss rate at which data elements in the data stream are not received at the jitter buffer by the end of their respective time periods.[6] The controller adjusts a duration of the time period based upon the loss rate.[7]

The invention of claim 23 is also described in other parts of the application, such as in the Summary of the Invention section.

Claims 24-33 are dependent upon claim 23.

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[3] Specification, paragraph [111], lines 13-16, e.g.
[4] Specification, paragraph [108], lines 2-3.
[5] Specification, paragraph [111], lines 1-4, e.g..
[6] Specification, paragraph [113], lines 7-8.
[7] Specification, paragraph [113], lines 13-17.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I.   Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,623,483 issued to Prathima Agrawal, et al.

II.   Claims 12-14, 21, 23-25, 30, 32 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of U.S. Patent 6,810,377 issued to Grant Ian Ho, et al.

ARGUMENT

I. Claim 1 is not anticipated under 35 U.S.C. § 102(b) by Agrawal et al. (US 5,623,483).

In the Office Action of April 5, 2007, the Examiner rejected claim 1 under 35 U.S.C. § 102(b) as being anticipated by Agrawal (US 5,623,483). 35 U.S.C. 102(b) states:

> A person shall be entitled to a patent unless... the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."[8]

Claim 1 is directed to:

> 1. A method of processing a transmitted digital media data stream comprising a stream of data elements, the method comprising steps of:
> (a) receiving the data stream;
> (b) holding each data element that is received prior to an end of a time period associated with each data element in a buffer until the end of the time period, at which time the data element is released for playout;
> (c) monitoring a loss rate at which data elements in the data stream are not received by the end of their respective time periods; and
> (d) adjusting a duration of the time period based upon the loss rate.

In the final Office Action of November 27, 2007, claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,623,483 ("Agrawal"). Claim 1 includes operations of "(b) holding each data element that is received prior to an end of a time period associated with each data element in a buffer until the end of the time period, at which time the data element is released for playout; (c) monitoring a loss rate...; and

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[8] *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

(d) adjusting a duration of the time period based upon the loss rate." The Examiner asserts that the time period referred to in operation (b) is satisfied by the timer 230 described in column 5, lines 24-33, of Agrawal.[9] Appellant respectfully disagrees and submits that the timer 230 of Agrawal merely defines a playout rate and not a playout deadline per claim 1.[10] Claim 1 defines a time period at the end of which the data element is released for playout, i.e., a playout deadline. Adjusting such a time period is not akin to adjusting the playout rate. Adjusting the the playout deadline does not affect the playout rate. Since the playout deadline changes for all of the data elements, the playout *rate* remains the same. That is, the playout of the data elements is just offset in time by the amount of the change of the playout deadline, while the rate of playout remains the same.

Furthermore, Agrawal does not teach adjusting the playout rate defined by the timer 230 based on a loss rate. The Examiner cites column 6, lines 15-17, of Agrawal, which states, "Control circuit 10 may also update the buffer operating characteristics, i.e., TED, buffer size, and pointer list in response to a changing PDD or PLR (packet loss rate)." However, Column 6, lines 15-17, does not teach or suggest adjusting the playout rate defined by the timer 230. Column 5, lines 24-39, of Agrawal talk about adjusting the timer 230 to the packet rate T_r minus the ratio of the buffer delay BD_i to the packet rate T_r. However, this adjustment is only done for the first packet in a stream and, more importantly, the adjustment made to the timer 230 is not based on a loss rate as in claim 1. Therefore, Appellant submits that claim 1 is not anticipated by Agrawal. Appellant therefore requests allowance of claim 1 and claims 2-11 depending therefrom.

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[9] Final Office Action, mailed 11/27/07, page 2.
[10] Agrawal patent 5,623,483, column 5, lines 24-33.

II. **Claims 12-14, 21, 23-25, 30, 32 and 33 are not obvious under 35 U.S.C. § 103(a) over Agrawal in view of Ho (US 6,810,377).**

In the Office Action of November 27, 2007, claims 12-14, 21, 23-25, 30, 32 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Agrawal in view of Ho (U.S. Patent 6,810,377). 35 U.S.C. 103(a) states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), laid out the standard of patentability to be applied in obviousness rejections, stating:

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.[11]

Independent claims 12 and 23 include limitations similar to those contained in claim 1. Appellant submits that claims 12 and 23, and claims 13, 14, 18-22, 24, 25 and 27-33 depending therefrom, are allowable for the reasons set forth above with respect to claim 1.

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[11] *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).
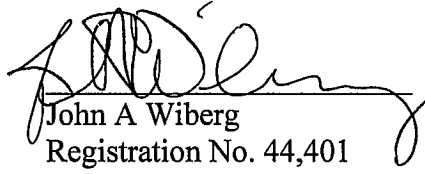
III.   Conclusion

For at least the foregoing reasons, Appellant submits that claims 1-14, 18-25, and 27-33 are allowable over the cited art. Reversal of the Examiner's rejection and issuance of a patent on the application are therefore requested.

The Commissioner is hereby authorized to charge $510 (to cover the Brief on Appeal Fee of $510) and any additional fees or credit any overpayment to the deposit account of McAndrews, Held & Malloy, Account No. 13-0017.

Dated: <u>August 28, 2008</u>   Respectfully submitted,

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APPENDIX

(37 C.F.R. § 1.192(c)(9))

The following claims are involved in this appeal:

1.   A method of processing a transmitted digital media data stream comprising a stream of data elements, the method comprising steps of:

(a)   receiving the data stream;

(b)   holding each data element that is received prior to an end of a time period associated with each data element in a buffer until the end of the time period, at which time the data element is released for playout;

(c)   monitoring a loss rate at which data elements in the data stream are not received by the end of their respective time periods; and

(d)   adjusting a duration of the time period based upon the loss rate.

2.   The method of claim 1 wherein adjusting step (d) comprises increasing the duration of the time period if the loss rate is above a first threshold.

3.   The method of claim 1 wherein adjusting step (d) comprises setting the duration of the time period at a first value if the loss rate is relatively low, and setting the duration at a second value, greater than the first value, if the loss rate is relatively higher.

4.   The method of claim 1 wherein adjusting step (d) comprises decreasing the duration of the time period if the loss rate is relatively low, and increasing the duration if the loss rate is relatively higher.

5.   The method of claim 1 wherein adjusting step (d) comprises:

(d)(i)   if the loss rate is lower than a first threshold, maintaining the duration of the time period at a present value; and

(d)(ii)   if the loss rate is greater than the first threshold, increasing the duration of the time period by a first amount.

6. The method of claim 5 wherein the first amount is substantially equivalent to a duration of the media represented by one data element.

7. The method of claim 5 wherein adjusting step (d) further comprises:

(d)(iii) if the loss rate is greater than a second threshold that is greater than the first threshold, increasing the duration of the time period by a second amount that is greater than the first amount.

8. The method of claim 7 wherein the first amount is substantially equivalent to a duration of the media represented by one data element and wherein the second amount is substantially equivalent to twice the duration of the media represented by one data element.

9. The method of claim 1 wherein adjusting step (d) comprises:

(d)(i) if the loss rate is lower than a first threshold, decreasing the duration of the time period;

(d)(ii) if the loss rate is greater than the first threshold but less than a second threshold, maintaining the duration of the time period at a present value; and

(d)(iii) if the loss rate is greater than the second threshold, increasing the duration of the time period.

10. The method of claim 1 wherein the data elements are frames of encoded data.

11. The method of claim 1 wherein the time period begins for each transmitted data element when the data element is sent by a transmitting end.

12. A method of estimating an unreceived data element of a transmitted digital media data stream comprising a stream of data elements, the method comprising steps of:

(a) receiving the data stream;

(b)   holding each received data element in a jitter buffer until an end of a time period associated with each data element, at which time the data element is released for playout;

(c)   estimating a parameter of an unreceived data element based on a received subsequent data element;

(d)   monitoring a loss rate at which data elements in the data stream are not received by the end of their respective time periods; and

(e)   adjusting a duration of the time period based upon the loss rate.

13.   The method of claim 12 wherein estimating step (c) comprises estimating a parameter of the unreceived data element based on a plurality of received subsequent data elements.

14.   The method of claim 12 wherein estimating step (c) comprises estimating a parameter of the unreceived data element based on the received subsequent data element and on a prior data element that precedes the unreceived data element in the data stream.

18.   The method of claim 12 wherein adjusting step (e) comprises increasing the duration of the time period if the loss rate is above a first threshold.

19.   The method of claim 18 wherein adjusting step (e) comprises increasing the duration of the time period by an amount that is substantially equivalent to a duration of the media represented by an integer number of data elements if the loss rate is above the first threshold.

20.   The method of claim 18 wherein adjusting step (e) further comprises decreasing the duration of the time period if the loss rate is below a second threshold that is lower than the first threshold.

21.   The method of claim 12 wherein the time period begins for each transmitted data element when the data element is sent by a transmitting end.

22. The method of claim 12 wherein the data elements are frames of encoded data.

23. A system of estimating an unreceived data element of a transmitted digital media data stream comprising a stream of data elements, the system comprising:

a jitter buffer adapted to receive a transmitted digital media data stream and to hold each received data element until an end of a time period, at which time the data element is released for playout;

a lost data element recovery mechanism adapted to estimate a parameter of an unreceived data element based on a received subsequent data element that follows the unreceived data element in the data stream; and

a controller adapted to monitor a loss rate at which data elements in the data stream are not received at the jitter buffer by the end of their respective time periods and to adjust a duration of the time period based upon the loss rate.

24. The system of claim 23 wherein the lost data element recovery mechanism is adapted to estimate a parameter of the unreceived data element based on a plurality of received subsequent data elements that follow the unreceived data element in the data stream.

25. The system of claim 23 wherein the lost data element recovery mechanism is adapted to estimate a parameter of the unreceived data element based on the received subsequent data element and on a prior data element that precedes the unreceived data element in the data stream.

27. The system of claim 23 wherein the controller is adapted to increase the duration of the time period if the loss rate is above a first threshold.

28. The system of claim 27 wherein the controller is adapted to increase the duration of the time period by an amount that is substantially equivalent to a duration of

the media represented by an integer number of data elements if the loss rate is above the first threshold.

29. The system of claim 27 wherein the controller is further adapted to decrease the duration of the time period if the loss rate is below a second threshold that is lower than the first threshold.

30. The system of claim 23 wherein the time period begins for each transmitted data element when the data element is sent by a transmitting end.

31. The system of claim 23 further comprising:

a decoder adapted to receive data elements from the jitter buffer and to decode the data elements to produce decoded data elements representing media samples.

32. The system of claim 23 wherein the media data stream is an encoded audio data stream comprising a plurality of audio data elements, each representing a portion of a transmitted audio session.

33. The system of claim 23 wherein the data elements are frames of encoded data.

EVIDENCE APPENDIX

Not applicable.

RELATED PROCEEDINGS APPENDIX

The Appellant is unaware of any related appeals or interferences.